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healthy papilla, or stimulation of the peripheral end of the divided glosso-pharyngeus, cause profuse secretion. Eight days after division of the nerve, the exterior of the papilla does not exhibit any important change visible to the naked eye, but stimulation of the peripheral trunk no longer produces secretion. If, however, the surface of the papilla be exposed to strong induction shocks, the glands continue to secrete for a while longer. By the fifth or sixth week no farther secretion takes place. In the case of a rabbit, investigated six months after division of the glosso-pharyngeus, the divided nerve had united, and the papilla experimented upon appeared to execute its functions quite normally. These experiments, Drasch says, "prove that in general, all gustable substances, when brought upon the taste papillae, or near them, induce secretion of the lingual glands, discharging into the furrows and trenches of the papillae. This secretion is due to reflex action, . . . and is brought about chiefly by means of the intra-epithelial plexus of nerves situated above the bulbs." "The glandular secretion serves for the washing away of dissolved gustable substances, and for continuous cleansing of the papillae. The time that elapses between touching the papilla with a gustable substance, and the subsequent secretion, must be such as to allow the substance in solution to penetrate as far as the bulbs. Yet the hypothesis, that over the entire papilla there are scattered fibres (having a free ending) which are capable of tasting is not inadmissible." F. T.

On the Auditory Labyrinth of Orthagoriscus Mola L. D'ARCY W. THOMPSON. Anat. Anzeiger, Jahrg. III, 1888, S. 93-96.

Professor Thompson found the auditory labyrinth of Orthagoriscus to differ in some respects from that of all Teleostean fishes. It hangs suspended by webs of delicate connective tissue within a wide space, continuous with the brain-cavity, as in Chimaera. A single vertical pillar of cartilage passes down across this space, within the arc of the horizontal canal. In the membranous labyrinth the following parts are distinguishable: laticulus with sinus superior, recessus utriculi, the three semicircular canals with their ampullae, and the sacculus and lagena. Six nerve-endings are visible, three cristae ampullarum, macula recessus utriculi, maculae sacci and lagena. The macula neglecta was wanting, and no trace of the ductus endolympaticus was seen. No true otoliths are present, but instead the maculae are supplied with many small white otoconia, aggregated together. A few of these have a cubical crystalloidal form, similar to those of Acanthias, but most of them are round or oval, rough on the surface, and concentrically striated within. The proportions of the labyrinth are unusual, the semicircular canals being disproportionately long and the vestibule very small. Orthagoriscus differs from all other fishes except Lophobranchii in the complete conjunction of utriculus and sacculus, that is, in the absence of any distinction of pars superior and inferior. F. T.

On the Fate of the Muscle-plate, and the Development of the Spinal Nerves and Limb Plexuses in Birds and Mammals. A. M. PATERSON. Quart. Journ. Micr. Sci., Vol. XXVIII, 1887, pp. 109-129, pls. VII and VIII.

The author concludes from an examination of many sections that the spinal nerves are developed from epiblast throughout their entire

length. He has traced the spinal nerves, not only the nerve-roots, but also the trunks and the plexuses, as a centrifugal growth from the spinal cord. The growth of the nerves is both interstitial and terminal. They consist at first of rounded cells, in an active state of proliferation ; in older embryos these become ovoid, and finally fusiform. These fusiform cells, by the alteration of their protoplasm, become converted into nerve-fibres. The development of the nerves in the limbs takes place as follows : The primitive nerve grows out beyond the lower end of the muscle-plate, and reaches the root of the limb. It there spreads out into an irregular series of processes, which pass into the undifferentiated tissue of the limb. These branches, later, arrange themselves in two trunks, one dorsal, the other ventral, which extend still farther into the limb and enclose between them a mass of blastema, from which the cartilaginous basis of the limb is formed. The dorsal and ventral trunks fuse with adjacent dorsal and ventral trunks to form two broad flat bands, from which, still later, the individual nerves as found in the adult are produced.

F. T.

II.—EXPERIMENTAL.

Studien über Licht- und Farbenempfindung. A. EUGEN FICK. Pflüger's Archiv, Vol. 43, p. 441.

This valuable set of experiments on the limits of the light-sense and the color-sense, which were carried out with the assistance of Fräulein N. Fick, throw doubt on a number of results apparently obtained by Charpentier, and also serve to settle some other points which have been for some time in dispute. A former observation, the correctness of which was denied by Charpentier, is, in the first place, confirmed, namely, that the color of several separate small points is more readily detected than that of one of them. It is then pointed out that the results of Charpentier's quantitative experiments, in regard to the threshold for light and color, show an agreement which would be impossible if they had been conducted with sufficient care, and it is shown that they are in fact erroneous. Any absolute determination of a threshold for the perception of the light and color of a small faint object in an otherwise dark field is proved to be an impossible task, owing to the very great differences of sensitiveness exhibited by different individuals, and by the same individual from day to day, or even from moment to moment, and owing also to the different degree of sensitiveness of different portions of the retina, combined with the impossibility of keeping the eye steady when looking at a dark field. The facts in regard to the latter point have been variously set down,—Aubert and Erdmann, for instance, believing that any apparent difference between the fovea and the adjacent parts of the retina is due to the more rapid fatigue of the latter, and disappears after adaptation has taken place. This Fick shows to be very far from being the case. He secured good fixation by introducing two minute bright points above and below, and looking at a point half way between them. He found that the light-sense and the color-sense present opposite phenomena ; the latter is more acute and the former is less acute at the fovea than at the other portions of the macula lutea. The sensitiveness for light reaches a maximum on the temporal side of the eye, somewhere